“Fingerprints cannot lie, but liars can make fingerprints.”

—unknown
Objectives

You will understand:

- Why fingerprints are individual evidence.
- Why there may be no fingerprint evidence at a crime scene.
- How computers have made personal identification easier.
You will be able to:

✓ Identify the anatomy of fingerprints
✓ Distinguish among types of fingerprints
✓ Define the three basic properties that allow individual identification by fingerprints.
✓ Obtain an inked, readable fingerprint for each finger.
✓ Recognize the general ridge patterns (loops, whorls, and arches).
✓ Identify friction ridge characteristics and compare two fingerprints with at least ten points of identification.
✓ Explain the differences among latent, plastic, and visible fingerprints.
✓ Develop latent prints (make them visible) using physical and chemical methods.
Dactyloscopy: The study of Fingerprints

History from 1850 to 1900

William Herschel—required Indians to put their fingerprints on contracts, and used fingerprints as a means of identifying prisoners

Henry Faulds—claimed that fingerprints did not change over time and that they could be classified for identification

Alphonse Bertillon—proposed body measurements as a means of identification; termed *anthropometry*
Dactyloscopy, Continued

Francis Galton—developed a primary classification scheme based on loops, arches, and whorls

Edward Richard Henry—in collaboration with Galton, instituted a numerical classification system

Juan Vucetich—developed a fingerprint classification system based on Galton’s that is used in Spanish-speaking countries
Fingerprints

Fundamental Characteristics of Fingerprints

A. A fingerprint is an individual characteristic.

B. A fingerprint remains unchanged during an individual’s lifetime.

C. Fingerprints have general characteristic ridge patterns that permit them to be systematically classified.
Fundamental Characteristics of Fingerprints, Continued

D. Fingerprints are formed in first trimester

E. Created from a series of lines (ridges) and grooves. Ridge patterns are called MINUTIAE
Chapter 4

Fingerprints

Kendall/Hunt Publishing Company
Fingerprint Minutiae
Chapter 4

Fingerprints

John Dillinger

http://www.youtube.com/watch?v=ICNTjg1hnj8
Secretions come from Three Glands:

- **Eccrine**—Secretes **WATER, INORGANIC** (ammonia, chlorides, metal ions, phosphates) and **ORGANIC** (amino acids, lactic acids, urea, sugars) **COMPOUNDS**.

  Most important for fingerprints.

- **Apocrine**—secretes pheromones and other organic materials.

- **Oil**—secretes fatty or greasy substances.
Latent fingerprints are **NOT VISIBLE** to the naked eye. Consist of the **natural secretions** of human skin. Require development for them to become visible.
Loop

Must have one or more ridges **ENTERING** and **EXITING** from the **SAME** side.

- Loops must have **ONE DELTA**.

**Types**

- **Radial**—opens toward the thumb
- **Ulnar**—opens toward the “pinky” (little finger)
Whorl

- Has at least one ridge that **makes a complete circuit**.
- Whorls have at least **two deltas** and a core.

Subcategories
- A double loop is made of two loops.
- An accidental is a pattern not covered by other categories.
Chapter 4

Fingerprints

Whorl

Types
Plain
Central pocket
Double loop
Accidental
Arch

Friction ridges **ENTER** on one side of the finger and **EXIT** on the other side.

Rise upward in the middle.

They do NOT have **type lines, deltas, or cores**.

**Types:**

Plain or Tented
Ink Print Instructions

- Roll Fingerprints
- Cleanup/Wipe down desk if needed
- Identify & Label the fingerprint type (L, W, A) right under each fingerprint on your card
- Tally your Fingerprint Types on the “Fingerprint Analysis” worksheet (Step 1)
Ridge Characteristics

**Minutiae**—characteristics of ridge patterns

- Ridge ending
- Bifurcation or fork
- Island or short ridge
- Dot
- Bridge
- Spur
- Eye or enclosure
- Double bifurcation
- Delta
- Trifurcation
Primary Classification

The Henry-FBI Classification System

Each finger is given a point value.
Primary Classification, continued

Assign the number of points for each finger that has a whorl and substitute into the equation:

\[
\begin{array}{cccccc}
\text{right} & \text{right} & \text{left} & \text{left} & \text{left} & +1 \\
\text{index} & \text{ring} & \text{thumb} & \text{middle} & \text{little} & \\
\hline
\text{right} & \text{right} & \text{right} & \text{left} & \text{left} & +1 \\
\text{thouble} & \text{middle} & \text{little} & \text{index} & \text{ring} & \\
\end{array}
\]

That number is your primary classification number.
Comparison

There are no legal requirements in the United States on the number of points required for a match. Generally, criminal courts will accept 8 to 12 points of similarity.
Developing a print requires substances that interact with secretions, causing the print to stand out against its background.

- **Black Ruby Magnetic Powders**—adhere to both water and fatty deposits. Choose a color to contrast with the background.

- **Iodine**—fumes react with oils and fats to produce a temporary yellow-brown color.
Developing Latent Prints, continued

*Ninhydrin*—reacts with amino acids to produce a purple color.

*Silver nitrate*—reacts with chloride to form silver chloride, a material that turns gray when exposed to light.

*Cyanoacrylate*—“superglue” fumes react with water and other fingerprint constituents to form a hard, whitish deposit.
Iodine Fingerprint
Ninhydrin Fingerprint

1) Apply Prints to Paper
2) Spray with Ninhydrin
3) Hold over Boiling water to speed up chemical reaction

(reacts with amino acids to produce a purple color)

**Only prints in portfolio that don’t require minutiae points
Cyanoacrylate Fingerprints
Other Prints

Lips—several common patterns

Voice—electronic pulses measured on a spectrograph

Foot—size of foot and toes; friction ridges on the foot

Shoes—can be compared and identified by type of shoe, brand, size, year of purchase, and wear pattern
Other Prints, *continued*

**Palm**—friction ridges can be identified and may be used against suspects
Other Prints, *continued*

**Footprints** are taken at birth as a means of identification of infants.
Earprint catches murderer

A man has been convicted of suffocating an elderly woman on the basis of ear print evidence. The assailant was caught after police matched the imprint of his ear on the victim’s window. Police believe that the thief put his ear to the window to listen for signs of anyone home.
Other Prints, *continued*

**Teeth**—bite marks are unique and can be used to identify suspects. These imprints were placed in gum and could be matched to crime scene evidence.
Other Prints, *continued*

The **blood vessel patterns** in the eye may be unique to individuals. They are used today for various security purposes.
AFIS

The Automated Fingerprint Identification System—a computer system for storing and retrieving fingerprints

Established in the 1970s, AFIS enables law enforcement officials to:

Search large files for a set of prints taken from an individual
Compare a single print, usually a latent print developed from a crime scene

By the 1990s, most large jurisdictions had their own system in place. The problem: A person’s fingerprints may be in one AFIS database but not in others.

IAFIS—the FBI’s Integrated Automated Fingerprint Identification System, which is a national database of all 10-print cards from all over the country
Biometrics

Use of some type of body metrics for the purpose of identification. (The Bertillon system may actually have been the first biometry system.)
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Use of some type of body metrics for the purpose of identification. (The Bertillon system may actually have been the first biometry system.)
Biometrics

✓ Used today in conjunction with AFIS.

✓ Examples include retinal or iris patterns, voice recognition, hand geometry.

✓ Other functions for biometrics: can be used to control entry or access to computers or other structures; can identify a person for security purposes; can help prevent identity theft or control social services fraud.